Journal of Veterinary and Biomedical Sciences
Vol. 8(1). PP. 1-7, September, 2026
ISSN:2659-0743

DOI: 10.36108/jvbs/6202.80.0110

A Study on the Parasitic Helminths Associated with Fishes in Jos South and Barkin Ladi Local Government Areas, Plateau State, Nigeria

Moses, Gyang D.[1], Okotie, Akpofure B.[2], Kabantiyok Dennis[3]., Joy Rindah Rindaps[4] and Nwachukwu Eberechukwu E.[5]

1. Diagnostic Laboratory Services Division, National Veterinary Research Institute, Vom Nigeria.
2. Federal College of Animal Health and Production Technology Vom, Nigeria.
3. Diagnostic Laboratory Services Division, National Veterinary Research Institute, Vom Nigeria.
4. Department of Drug Development, National Veterinary Research Institute, Vom, Nigeria.
5. Department of Medical Microbiology, University of Jos, Nigeria

Corresponding Author: mosesgyang@yahoo.com +234(0)8038034382

ABSTRACT

Helminthic parasites have been a major factor limiting the production of fish in our locality and the world over. The fish industry has suffered a lot of economic losses due to fish morbidity and mortality. Treatment of the affected fish has drained a lot of resources and time. These parasites have brought production down in many parts of the world, especially Nigeria. These parasitic diseases have also caused a lot of public health concern to man and other animals. So it is important that the parasites are known in order to take proper steps in mitigating their effects, as this will help to step up production for enhanced protein production. This study was carried out to determine the prevalence of gastrointestinal helminths in tilapia fish (*Orechromis niloticus*) in Jos South and Barkin Ladi Local Government Area of Plateau State, Nigeria. The major objectives were to identify the gastrointestinal helminths present in tilapia fish in the study area, differentiate the pathogenic helminth species of tilapia fish, and determine the prevalence of gastrointestinal helminths in tilapia fish based on location. An overall prevalence of 26% was recorded in this study; comparison was made between both locations which showed prevalence rates of 32% in Barkin Ladi Local government area, and 20% in Jos South Local Government Area. The difference between both locations was not statistically significant (P>0.05).

Keywords: Gastrointestinal, Helminths, Tilapia fish (*Orechromis niloticus)*

1.0 INTRODUCTION

The world over, search for an enduring and sustainable food security has been the main goal of most nations. Fish has been one of the main sources of animal protein that is relatively available for both high and low-class citizens [1]. Fish is cheap and apart from serving as a source of protein, it also contains lipids, omega-3 fatty acids, minerals, vitamins, and oils with desirable low levels of cholesterol [2,3]. Fresh water fish serves as definitive, intermediate or paratenic (transport) host in the life cycle of many species of protozoan, metazoan and crustacean parasites [1]. Parasites are organisms that live on or within an organ of another species from which it obtains nutrients. Globally, translocating and subsequent introduction of freshwater fish into non-native regions has been known to cause a serious effect on the native biota [4]. Parasites can bring about a decline in the swimming ability, growth rate and an increase in mortality of fish. These parasites constitute a major problem to fish health, causing a whole lot of disease conditions [5–9]. These diseases often lead to weakened hosts' immune systems thereby increasing their vulnerability to other secondary infections [9].

The effects of these diseases result to nutritive devaluation of fish and fish loss [9]. For healthy and quality fish meat to be produced, it is important that the fish be free from all kinds of pathogens like bacteria, algae, protozoans, helminths, annelids, arthropods and molluscs [6,9]. In fish farming or aquaculture, some parasites may be highly pathogenic and contribute to high fish mortalities and economic losses while in natural systems, thereby threatening the abundance and diversity of indigenous fish species and the aquatic food chain [1]. It is difficult to estimate economic losses attributable to these agents in Nigeria. However, the US reported in 1989 that up to $23 million was lost as a result of parasitic infection on catfish and trout rearing [5]. These parasites usually affect the economic value of fish produced and at same time, raise public health concerns especially in areas where raw or smoked fish is a delicacy. Some zoonotic diseases may result from the ingestion of raw or under cooked fish [1,6]. Host specificity of nematodes is variable; for example, *Procamallanus laevionchus* has been reported from six different hosts' families of fish, *Paracamallanus cyathopharynx* only from *Clarias* species, but *Rhabdochona congolensis* and *Spinitectus allaeri* have been reported from diverse fish host species. Those very host-specific involve species of *Capillaria*, most oxyurids, and the philome*trids Nilonemagymnarchi* and *Thwaitiabagri.* [8] reported the inter-connectivity of fish diseases between different fish species and parasites infection.

The overall prevalence of helminths in Zaria, Imo and Calabar rivers were 19.17%, 13.6% and 3.33% respectively. While in Jos, 52.0% and 34.67% were reported in cultured and wild population of *Clarias gariepinus* respectively and 59.8% and 63% in cultured and wild *Clarias lazera*. He also reported that parasitism was 47% among *Chromodotilapia guntheri* and *Tilapiae mariae* in Owa stream South East Nigeria [8]. Due to the dietary importance of fish and its potential role as vehicle for the transfer of parasites, study into parasitic helminths associated with fish in the aquatic condition is relevant. The aim of this study was to determine the prevalence of gastrointestinal helminths in tilapia fish in the study areas (Barkin Ladi and Jos South Local Government Areas).

MATERIALS AND METHODS

1.1 Study Area

Samples were collected from two local government areas (Barkin-Ladi and Jos South LGAs) of Plateau State. The State has a land mass of 26,899 square kilometres, with an estimated population of three million people. It is located between latitude 08°24′N and longitude 008°3′E and 010°38′E. The altitude ranges from around 1,200 meters (3,900ft) above sea level, having a near temperate climate with an average

temperature of between 13-22 °C. Jos South Local government area has its headquarters located in Bukuru town on 9°55′ 42.56′N 8°53′ 31.63′E. It has an area of 510km² and a population of 306,716 from the 2006 census. It is the second most populated local government area in the state after Jos North LGA. Barkin Ladi local government has its headquarters in Barkin Ladi located at 9°31.24′N 8°50.10′E | 9.533°N 8.9°E. It has an area of 1,032km² and a population of 175,267 from the 2006 census [10].

2.2 Methodology

A total of 100 fresh tilapia fish were sourced from both study areas. A total of 100 fishes were caught from Bukuru Stream, Jos South LGA, and Ladi River in Barkin Ladi LGA. The gastro-intestinal tract samples were collected from the fishes, 50 from each local government area (LGA).

The fishes were immediately transported to the post mortem room of the National Veterinary Research Institute, Vom, where the gastrointestinal tracts (GITs) were harvested into universal bottles and taken to the parasitology laboratory for analysis. The (GIT) of the tilapia fish was placed in a mortar and gently crushed with a pestle to release all parasites stuck to the walls of the GIT; then few millilitres of flotation solution (saturated salt solution) were added to the crushed GIT. The solution was sieved with a tea strainer into a universal container. Additional flotation solution was poured into the universal container and a cover slip was gently placed on top of the fluid avoiding air bubbles, then left undisturbed on a bench for 15 minutes to allow the cyst and egg to float. A cover slip was carefully lifted from the fluid top and placed face down on a microscopic slide for visualization as described by [11].

2.3 Microscopy

The specimens were viewed under a microscope with lower power objective (x40). Parasites were identified based on their characteristic forms, that is the eggs (ova), cysts, and larvae (Jeffery and Leach, 1995) and matched with charts, and the results were recorded accordingly.

3.0 RESULTS

Out of the 100 samples collected 26 were positive for gastrointestinal parasites (Table 1). Greater proportion had mixed infection in Jos South (30.0%) and Barkin Ladi (43.8%). *Philometra fasciati, Diphylobothrim latum procercoid, Eustrongylides, Clornochissinesnsis (metacercaria) and Brooklynella hostiles* were only found in Jos South LGA (Table 3).

Diphylobothrim latum, Paravortex, Capillaria and Cryptocarvonirritans were only found in Barkin Ladi (Table 4)
Though not statistically significant (p=0.127), the prevalence was higher in Barkin Ladi (32.0%) than in Jos South (20.0%) (Table 2).

3.1 Statistical Analysis

The study was statistically analyzed using Z test at $p<0.05$. Statistical pack for the social science (SPSS version 28.0) was used for the data analysis. A two sample Z – test was used for statistical significance. Data were presented in tabulated and chart forms and expressed in percentages.

Table 1: Overall Prevalence of Gastrointestinal Helminths in Tilapia fish sourced from Barkin Ladi and Jos South L.G.As.

No. of fish examined	No. positive for helminths	% Prevalence
100	26	26.0

Table 2: Prevalence of Gastrointestinal Helminths in Tilapia Fish based on location

Location	No. of fish sampled	No. positive	% Prevalence	P-value
Jos south	50	10	20.0	0.127
Barkin Ladi	50	16	32.0	

Table 3: Percentage Distribution of Parasites identified in Barkin Ladi and Jos South LGAs

SPECIES	**No. Positive**	**BL (%)**	**No Positive**	**JS (%)**
Philometra faciati	0	0	1	10
Diphyllobothrium latum procercoid	0	0	1	10
Eustrongyloid	0	0	1	10
Schistocephalus solidus	2	12.5	1	10
Clornochis sinensis cercaria	1	6.25	2	20
Clornochis sinensismeta cercaria	0	0	1	10
Ichthyphythrium multifilis	0	0	0	0
Diphyllobothrium latum	2	12.5	0	0
Paravotex	2	12.5	0	0
Brooklynella hostiles	0	0	0	0
Capillaria	1	6.25	0	0
Cryptocaryonirritans	1	6.25	0	0
Mixed infection	7	46.75	3	30
Eimeria vanasi	50	100	50	100

Key: BL= Barkin Ladi; JS= Jos South.

4.0 Discussion

Fish has become an increasingly important source of protein due to its wide acceptance and the promising health benefit associated with white meat [12].With the rising demand for fish, comes the need for its safety because helminths of zoonotic potential have been identified in different species of fishes [13].

The results of this study revealed 26% overall prevalence rate of gastrointestinal helminths in the Tilapia fish sampled from Barkin Ladi and Jos South LGA which is not statistically significant.

Similar studies conducted by [14],[15] and [16] produced corroborating results reported the presence of helminths in Tilapia. The prevalence of gastrointestinal helminths was found to be more frequent in fishes sampled from Barkin Ladi (32%) and lesser Jos South (20%). Although, the prevalent rate of gastrointestinal helminths in Tilapia fish reported in this current study was lower than the findings of [17] who recorded 53.40% in Kano, 60.23% reported by [18] in Ekiti, 56.4% reported by [6] in Ilorin and 37.10% reported by [14] in Jos. It is however, higher than 18.70% reported by [19] in Maiduguri. This suggests that the occurrence of these parasites vary from one habitat to the other which could be due to host - parasite relationship and abiotic factors such as dissolved oxygen, temperature and pH [6,16]. Several other research findings have also shown that helminths are mostly found in fresh water fishes where factors such as parasite species and its biology, host and its feeding habitats, physical factors, hygiene of the water body and presence of intermediate hosts contribute to their prevalence and intensity. [15, 20–23] reported that 109 different parasite species were recorded in the same number of fish species from more perennial systems in Queensland, on the east coast of Australia.

4.1 Limitations

Due to inability to catch the fishes, we had to buyback specimen from local fishermen which might have introduced bias in the distribution of the fishes collected for the study

5.0 Conclusion

The frequency of gastrointestinal parasites in tilapia fish species is apparently on the rise and may be one of the significant constraints to maximal production of fish, leading to an economic loss. It is important to know that gastrointestinal parasitic infections could alter the normal growth of fishes, hindering adequate growth and weight gain in adult fish to attain good market value. It could also affect palatability, productivity and aesthetic value of infested fish.

5.1 Recommendations

It is therefore recommended that Tilapia fishes' culturists should be enlightened on the need to routinely treat their fishes using appropriate anthelminthic agents for maximum production. Moreover, fishes meant for human consumption should be properly eviscerated and well-cooked before consumption to prevent human and other animal health hazard of zoonotic fish helminths. Factors such as dissolved oxygen, temperature, turbidity and pH should be checked constantly and ensured they are kept constant. It is necessary to eliminate all conditions that favor parasitic infection.

5.2 Conflict of Interests

Authors declare no conflict of interest

5.3 Authors Contribution

MG and OA conceptualized and designed the study. Field work and data collection was conducted by MG and OA. Initial draft was by MG and OA. KD, NE and JR reviewed the final draft and made corrections. All authors read the final draft and gave approval

References

1. Ogonna C., Emmanuel I., Michael D. (2017). Survey of ectoparasites of cultured fish from selected farms in Ebonyi State: potential for food and nutrient security. *Int J Pharm Res Biosci.,* 4:1–6.

2. FAO: *The State of Food Insecurity in the World* (2009). *Economic Crises - Impacts and Lessons Learned - World | ReliefWeb*. 2009.

3. Balami S, Karn R (2019). Significance Of Nutritional Value Of Fish For Human Health Article in Malaysian Journal of Halal Research. doi:10.2478/mjhr-2019-0012.

4. Smit NJ, Malherbe W, Hadfield KA (2017). Alien freshwater fish parasites from South Africa: Diversity, distribution, status and the way forward. *Int J Parasitol Parasites Wildl*, 6, 386–401.

5. Ueda BH, Karling LC, Takemoto RM, Pavanelli GC (2013). Parasites of the freshwater fish trade in Brazil: science metric study. *Pesqui Veterinária Bras*, 33,851–854.

6. Amaechi C. (2014). Prevalence, intensity and abundance of endoparasites in Oreochromis niloticusand TilapiazillifPisces: Cichlidae) from Asa Dam, Ilorin, Nigeria. *scielo.sa.cr*, **7**,67–70.

7. Uche UC, Mao PS, Danladi SI, Adeola BF, Uche UC, Mao PS, Danladi SI, Adeola BF (2018). Parasites associated with Clarias gariepinus (African catfish) from dam, plastic and concrete ponds in Bauchi metropolis, Bauchi State, Nigeria. *https://gsconlinepress.com/journals/gscbps/sites/default/files/GSCBPS-2018-0003.pdf*, 2,001–005.

8. Adebambo AA. (2020). Fish species parasites: A review in Nigerian water bodies. *J Res For Wildl Environ*, 12:223–234.

9. Osimen EC, Anagha LI (2021). Endoparasites of fresh water fishes from rivers in Edo State, Nigeria. *Sokoto J Vet Sci*, 18,197–204.

10. Plateau (State, Nigeria) - Population Statistics, Charts, Map and Location. [date unknown],

11. Cheesbrough M (2006). *District Laboratory Practice in Tropical Countries*. Cambridge University Press.

12. Adedeje O, Okerentugba P, Innocent-Adiele H, Okonko I. (2012). Benefits, public health hazards and risks associated with fish consumption. *New York Sci J.*, **5**:33–61.

13. Majewska AA, Huang T, Han B, Drake JM (2021). Predictors of zoonotic potential in helminths. *Philos Trans R Soc B Biol Sci*, **376**.

14. Goselle O., Shir G., Udeh E., Abelau M, Imandeh G. (2010). Helminth parasites of *Clarias gariepinus* and *Tilapia zilli* at Lamingo dam, Jos, Nigeria. *Sci World J*, **3**:23–28.

15. Onyedineke NE, Obi U, Ofoegbu PU, Ukogo I (2010). Helminth parasites of some freshwater fish from River Niger at Illushi, Edo State, Nigeria. *J Am Sci*, **6**:16–21.

16. Amare A, Alemayehu A, Aylate A (2014). Prevalence of internal parasitic helminthes infected Oreochromis niloticus (Nile tilapia), Clarias gariepinus (African catfish) and Cyprinus carpio (common carp) in Lake Lugo (Hayke), Northeast Ethiopia. *North East Ethiop J Aquat Res Dev* 2014.

17. Bichi A, Ibrahim A (2010). A survey of ecto and intestinal parasites of *Tilapia Zillii* (Gervias) in Tiga lake, Kano, northern Nigeria. *Bayero J Pure Appl Sci*, **2**:79–82.

18. Olofintoye LK (2006). Parasitofauna in some freshwater fish species in Ekiti State, Nigeria. *Pakistan J Nutr*, 5:359–362.

19. Biu AA, Nkechi P. (2013). Prevalence of Gastroinstestinal Helminthes of Tillapia zilli(Gervais 1848) in Maiduguri, Nigeria. *Niger J Fish Aquac*, **1**:20–24.

20. Shukerova S, Kirin D, Hanzelová V (2010). Endohelminth communities of the perch, Perca fluviatilis (Perciformes, Percidae) from Srebarna Biosphere Reserve, Bulgaria. *Helminthologia*,

47:99–104.

21. Olurin K, Okafor J, Alade A, Asiru R, Ademiluwa J, Owonifari K, Oronaye O (2012). Helminth Parasites of Sarotherodon galilaeus and Tilapia zillii (Pisces: Cichlidae) from River Oshun, Southwest Nigeria. *Int J Aquat Sci*, 3:2008–8019.

22. Awharitowa A, Ehigiator, F, A R (2012). Helminth parasites of fishes from some rivers in so uthern Nigeria | Semantic Scholar. *African Sci* 2012,

23. Nimbalkar R K (2015). Studies on Prevalence of Platyhelminth Parasites of freshwater fishes from Sukhana Dam at Aurangabad District (MS) India. *Biosci Discov*, 6:125–128.

23 NIPOST (2009). "Post Offices- with map of LGAs". Archived from the original on 7 October 2009. Retrieved 2009-10-20.